Project Manager's Quarterly Progress Report –4thQuarter FY 2001
U.S. Large Hadron Collider Construction Project

1. PROJECT IDENTIFIERS

Reporting Period: Through **September 30, 2001**
Program Sponsors: DOE High Energy Physics Division/NSF Physics Division
DOE/NSF Program Manager: John O'Fallon[1], (301) 903-3624, john.OFallon@science.doe.gov
DOE/NSF Associate Program Manager: M. Goldberg, (703) 306-1894, mgoldber@nsf.gov
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2. PROJECT DESCRIPTION

The Department of Energy (DOE) and the National Science Foundation (NSF) have signed agreements committing to collaboration in the construction of the Large Hadron Collider (LHC) at CERN (European Laboratory for Particle Physics) and two of its associated detectors. The U.S. fabrication effort will be carried out at, or under the supervision of, U.S. universities and national laboratories under the terms and conditions described in the International Collaboration Agreement (Agreement) and its Accelerator and Experiments Protocols. The U.S. LHC Construction Project is defined by the goods and services to be provided to CERN under the terms of the Agreement between DOE, NSF, and CERN. These goods and services include DOE contributions to the LHC accelerator, and DOE and NSF contributions to the ATLAS (A Toroidal LHC Apparatus) and CMS (Compact Muon Solenoid) experiments.

The DOE contribution to the LHC accelerator consists of items provided by DOE National Laboratories and CERN direct purchases from U.S. industrial firms. The scope of these contributions is addressed in the Accelerator Protocol and described in detail in an Implementing Arrangement between the collaborating DOE National Laboratories and CERN. The DOE and NSF contributions to the ATLAS and CMS detectors consist of items supplied by the collaborating U.S. universities and DOE National Laboratories. The scope of these contributions is addressed in the Experiments Protocol and described in detail in Memoranda of Understanding for collaboration on construction of each experiment.

The U.S. LHC Construction Project includes the U.S. ATLAS, U.S. CMS, and U.S. LHC Accelerator projects. This report summarizes the overall status of the U.S. LHC Construction Project effort and includes more detailed status information on each sub-project. Additional information can be accessed at the following web sites:

U.S. LHC Project - http://doe-hep.hep.net/lhc.html

LHC Project - http://wwwlhc.cern.ch/	U.S. LHC Accelerator - http://www-td.fnal.gov/
ATLAS - http://atlasinfo.cern.ch/Atlas/Welcome.html	U.S. ATLAS - http://www.usatlas.bnl.gov/
CMS - http://cmsinfo.cern.ch/Welcome.html	U.S. CMS - http://uscms.fnal.gov/

[1] Acting, with concurrence of the NSF co-chair of the Joint Oversight Group

3. PROJECT MANAGER'S NARRATIVE HIGHLIGHTS

The current list of DOE/NSF project reviews and status meetings is provided below:

U.S. LHC Construction Project	Event	Date
U.S. LHC Accelerator	Quarterly Status Meeting	August 29, 2001
U.S. CMS Detector	Quarterly Status Meeting	August 30, 2001
U.S. CMS Detector	DOE/NSF Review	November 15, 2001
U.S. LHC Accelerator	DOE Review	December 3-4, 2001
U.S. LHC Program/Project	DOE/NSF Joint Oversight Group	December 10, 2001
U.S. ATLAS Detector	DOE/NSF Review/Quarterly	December 11, 2001

The results of these activities are documented in formal reports and meeting notes. The U.S. CMS and ATLAS projects submit monthly reports and the U.S. LHC Accelerator project submits a quarterly report. Current performance data is summarized in the following tables:

Table 3.1, Schedule Performance Indices

	Planned Complete (BCWS/BAC)	Actual Complete (BCWP/BAC)	Schedule Performance (BCWP/BCWS)
U.S. ATLAS	58%	57%	98%
U.S. CMS	70%	61%	88%
U.S. LHC Accelerator	72%	68%	95%

Table 3.2, Contingency Status (in thousands of dollars)

	Total Project Cost (TPC)	Budget at Completion (BAC)	Contingency	Budgeted Cost of Work Performed (BCWP)	Remaining Work to be Performed (BAC-BCWP)	Contingency/ (BAC-BCWP)
US ATLAS	163,750	135,594	28,156	77,909	57,685	49%
US CMS	167,250	139,165	28,085	85,301	53,864	52%
US Accelerator	110,000	103,828	6,172	70,892	32,936	19%

Table 3.3, Cost & Schedule Performance (in thousands of dollars) Indices

	Cumulative Costs to Date					Costs at Completion		
	Budgeted Cost			Variance			Revised	
	Work Scheduled	Work Performed	Actual Cost	Schedule	Cost	Budgeted	Estimate	Variance
U.S. ATLAS	79,110	77,909	73,021	-1201	4888	163,750	163,750	0
U.S. CMS	97,199	85,301	76,563	-11898	8738	167,250	167,250	0
U.S. LHC Accelerator	74,843	70,892	69,727	-3951	1165	110,000	110,000	0
CERN Invoices	24,456	24,456	24,456	0	0	90,000	90,000	0
U.S. LHC Total	275,608	258,558	243,767	-17050	14791	531,000	531,000	0

4. PROJECT MANAGER'S ASSESSMENT

The U.S. projects continue to meet their goals and are reliable and influential partners in the construction of the ATLAS and CMS detectors and the LHC machine.

Cost – Cost performance is good as material contracts are typically below estimates and labor costs continue to track close to plans. Each project maintains an adequate level of contingency, although the present EAC for the U.S. LHC Accelerator project indicates a contingency level that remains a minor concern.

The U.S. LHC Accelerator project office continues to actively and aggressively address this concern through careful revision of the estimate to complete for all three Lab's activities. The project office has approved changes to BNL superconducting cable test and dipole magnet work; LBNL absorber and luminosity instrumentation work; FNAL IR quad test stand work and accelerator physics work across Labs. A new cost estimate and cryo feedbox rebaseline proposal is under development.

The U.S. CMS contingency situation has remained steady. The project has reviewed cost growth in the Endcap Muon (EMU) system, and has accepted a revised cost estimate incorporating cost savings related to Cathode Strip Chamber production and alignment. Careful monitoring of EMU costs needs to continue.

The U.S. ATLAS project continues to carefully manage contingency, and is undertaking a sensitivity analysis for each subsystem to re-confirm realistic contingency estimates. The project conducted a review of ATLAS Technical Coordination efforts to date, which generally supported further use of contingency and a strong role for the U.S. in this area.

Schedule - Schedule performance is measured through milestone completion and by earned value. These measurements indicate that schedule progress is slightly behind plans averaging about ninety-three percent of the baseline plan, indicating no major slipages in schedule. The total U.S. LHC Project is sixty-two percent complete, based on earned value. CERN expects to complete construction of the LHC in 2005 and initiate collider commissioning in 2006. Current CERN schedule calls for first collisions in April 2006 and first physics in August 2006. The U.S. schedules are consistent with this goal.

The U.S. LHC Accelerator Project has coordinated with CERN to update the U.S. delivery milestones for deliverables. This update will reflect the current CERN LHC installation schedule and provide adequate float between expected U.S. delivery dates (based on the U.S. production schedules) and CERN installation requirements. CERN has worked with experiments to agree on a revised schedule, and this has been adopted by U.S. CMS . U.S. CMS has initiated a change request which incorporates this version and adjusts U.S. CMS milestones accordingly. The U.S. CMS Project Office continues to track this schedule and ascertain potential cost impacts on the project, to better plan installation and commissioning as well as project completion. U.S. ATLAS is updating the baseline schedule and float for each subsystem to reflect new CERN required delivery dates, based on the new CERN schedule and maintaining the project completion date of September 2005.

Technical- Good technical progress continues across the project, and we remain confident that the U.S. deliverables to CERN can be realized with the planned funding. The U.S. LHC Construction Project deliverables are accepted by CERN and approved by the DOE/NSF Joint Oversight Group. We expect to provide additional items to CERN, within the approved funding, should cost performance be favorable.

Important milestones continue to be met. Full production of the inner triplet quadrupole magnets has begun. In the CMS Muon system, the Russian and Chinese sites have begun Cathode Strip Chamber (CSC) production to meet a major CMS milestone after receiving tooling and kits from U.S. CMS. In U.S. ATLAS, Muon CSC chamber production has also begun. Additional technical Project highlights are given in section 5, and shown in the photos.

ISSUES

LHC Cost & Schedule – CERN is dealing with projected cost increases to complete the LHC. The LHC project is looking for ways to reduce the cost to complete, and CERN management is working with the CERN Council and Finance Committee to address the identified cost increases, and maintain schedule. CERN's schedule for the machine remains: ring closed/cold by 12/05, first collisions/pilot run starting 4/06, followed by a 3 month shutdown and first physics starting 8/06. If there are further technical delays and/or CERN is unable to secure additional funds, a schedule delay is likely. Both experiments are reworking initial detector configuration/installation plans with the goal of initial detectors ready for first collisions and complete detectors (with staging options) ready for the first physics run. ATLAS is completing a detailed, multi-phased installation scenario taking into account the plan for access to the underground cavern. CMS is planning and identifying resource issues associated with moving more assembly, testing and installation activities from the underground to the surface facility. DOE and NSF staff continue to closely monitor this planning activity.

ATLAS and CMS Resources– Estimates of the resources required to complete the experiments exceed the funding currently identified, as discussed at recent Resource Review Board (RRB) meetings. Funding shortfalls are driven by several factors: various institutes not meeting their original commitments, improved estimates of the funding required to complete the detectors, cost overruns on core items, exchange rate problems, and (mainly for CMS) civil construction delays. Both collaborations and CERN have indicated that they will work with the international Funding Agencies to seek additional resources, or develop appropriate work-around plans for completing the detectors. CMS and ATLAS are currently >50% complete. Experiment and civil construction cost status will be presented to the CERN Council and further addressed in December 2001.

5. NARRATIVE SUMMARY

5.1 U.S. ATLAS CONSTRUCTION PROJECT

ATLAS International- A second comprehensive review of the ATLAS project was conducted by the LHC Committee. The review noted that most systems are well into construction, and the time critical common components (magnets and liquid argon cryostats) are progressing satisfactorily. It was concluded that schedule is challenging, but installation of an initial working detector for physics in 2006 is considered realistic. Resource and schedule issues are being further addressed by ATLAS through development of a detailed plan for completion. Other ATLAS highlights are summarized below:

- The B0 toroid model of the barrel toroid coils reached and maintained the nominal current of 20.5 kA, validating manufacturing technologies and design concepts; production of the toroid coil casing by Alstom has started.
- Hadronic End-cap Calorimeter (HEC) beam tests have been successfully completed, ending a five-year test program; over half the HEC modules have been produced.
- A European vendor is making progress on delivery of radiation-hard voltage regulators needed for many electronics systems, and this continues to be addressed.

U.S. ATLAS- As of September 30, 2001 the project was actually 61 percent completed versus the 62 percent scheduled work. The U.S. Collaboration continues to make good technical progress, with no major technical issues identified. Costs have been controlled such that contingency as a fraction of cost to go has not been reduced. Most U.S. ATLAS subsystems are currently in production, and strong progress has been reported in the area of radiation-hard electronics. Schedule status indicates that U.S. ATLAS should meet ATLAS need dates for U.S. deliverables. Listed below are project highlights:

- Silicon Strips: thirty five ABCD wafers were delivered in August and began testing in September.
- Transition Radiation Tracker Mechanics: sufficient straw inventories were established over the last quarter. HV plate production has improved, machining of the thick plates for type 1 and type 2 has been completed and tested at Fermilab.
- Liquid Argon Electromagnetic Calorimeter: 22 Signal Feedthroughs and mechanical components of the HV feed-through were shipped to CERN. The prototypes of the barrel pedestal, crate with the bus bars were received and tested. The Deep Sub-micron version of the SCA Controller was successfully tested.
- Tile Calorimeter: seventy three percent of the 3-in-1 cards have been shipped to CERN. As of the end of September, forty-two modules have been constructed, and 36 modules shipped to CERN out of 64 modules to be shipped.
- Muon: Second series MDT Chambers started fabrication at all three U.S. sites on schedule. Prototype Chamber Service Module for the MDT electronics operated error-free at locations in the US and Europe. A large sample of test facility cosmic tracks has been accumulated.
- Trigger/DAQ: The choice of Gigabit Ethernet has been made as a physical link within the Supervisor RoI Builder (SRB) prototype design.

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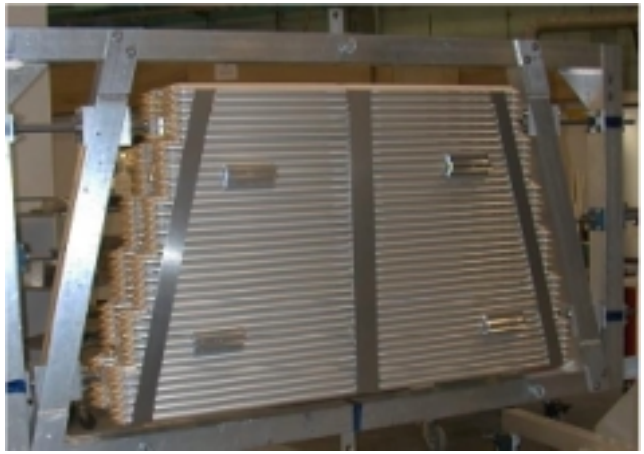
Above- U.S. ATLAS/BNL and CERN personnel with a BNL-produced signal feedthrough during installation into the barrel cryostat at CERN, Bldg 180 (see also picture at top right). Shown here, from l-r:
FRONT- Bob Hackenburg (BNL), Physicist; Tom Muller (BNL), Project Engineer; Pierre Pailler (CERN), Cryo Group Leader; Todd Corwin and Ken Sexton (BNL) technicians.
BACK- Patrick Fassnacht (CERN) Bldg Mgr; Dave Pate (BNL technician on-site at CERN).

Above- At CERN, BNL-produced Liquid Argon Calorimeter signal feedthroughs, and the mechanics for HV feedthroughs being installed in the calorimeter barrel cryostat.

Right- A module of the ATLAS Endcap-Inner-Layer (EIL)1 series muon Monitored Drift Tube (MDT) chamber, built by the U.S. Boston Muon Consortium of Universities, on a cosmic-ray test stand. Numerous high energy muon cosmic-ray tests of a module from this series have been performed, corresponding to 50,000,000 cosmic-ray triggers. Chamber resolution and operational characteristics have been observed over long periods, and data acquisition modules produced by the University of Michigan have been tested. Data has been quite good, and has indicated single tube resolution to be within the ATLAS specification of 80 μm per tube.



5.2 U.S. CMS CONSTRUCTION PROJECT

CMS International- CMS project management has finalized schedule milestones for the revised baseline to addresses constraints concerning availability of the underground experiment cavern, and the LHC Committee has approved this revision. Ready for installation milestones have been introduced to de-couple pre-assembly of major items from their use in the master assembly sequence. Shrinkage of the underground window will likely lead to cabling and commissioning defining CMS critical path, rather than mechanical assembly. Other CMS highlights are summarized below:

- Civil construction of the underground pillar is completed, but overall delay of the underground caverns expected to amount to one year compared with original plan.
- A standard length of CMS magnet conductor has been produced at Techmeta, and the winding machine has been tested at Ansaldo; magnet is on schedule.
- All Electromagnetic (ECAL) calorimeter crystals are now under contract; ECAL electronics efforts receiving increased manpower, and sustained management coordination to address schedule and technical challenges.
- Muon system chamber international production sites show good progress in early production.

U.S. CMS - As of 30 September 2001, the overall U.S. CMS Construction Project was 61 percent complete vs. the scheduled 70 percent complete. A DOE/NSF Quarterly status review was conducted at UCLA on August 30, 2001, which provided a closer look at the preparation of UCLA's FAST site along with a discussion of the ALCT design (critical path for EMU). Both issues appear to be well under control. A DOE/NSF Review will be held on November 15, 2001 Below are a few highlights of the U.S. CMS Construction Project:

- All CMS, and U.S. CMS L1, L2, and L3 milestones will be rebaselined to be consistent with the v31 set of international CMS milestones. These milestones are a subset of the CMS v31 general planning model, and have been approved by LHCC and CMS management, U.S. CMS management, and the relevant U.S. CMS L2 managers. This will be presented as a change request to the DOE/NSF Project Manager in November 2001.
- For the Endcap Muon, the CSC panel production is on cost and schedule. CSC chamber production is also near cost and schedule. Tooling for the foreign FAST sites at PNPI and IHEP has arrived, and both sites have passed production readiness reviews. The latest ALCT board have been tested and appear to work correctly. Start-up of the UCLA and UF FAST sites is now expected in Nov-Dec 2001.
- For the Hadron Calorimeter, the HB-1 has been delivered to CERN and has been reassembled at SX-5. The optical megatile factories are on cost and schedule and are scheduled to complete their work at the end of CY01. HCAL readout box work has started production. Procurements for the HCAL HPD's, HF fiber, and HF PMT's are all imminent.
- Assembly of the endcap steel yokes are on cost and schedule. U.S. CMS has saturated our obligations to the Common Project at $23M.

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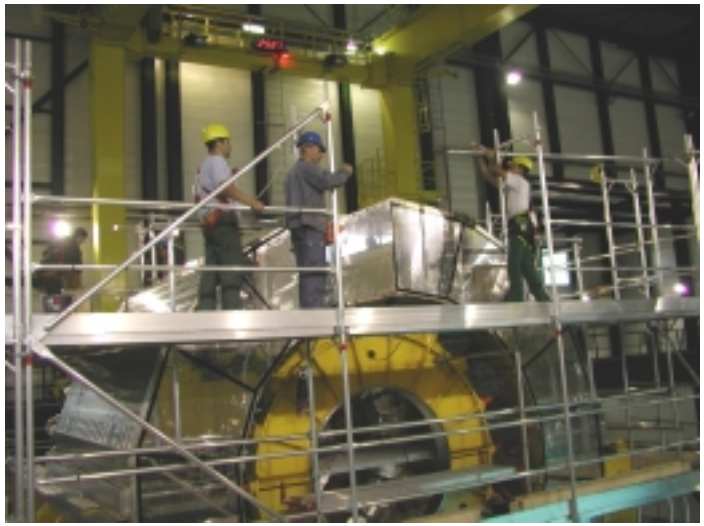
Above- A Cathode Strip Chamber (CSC) at UCLA undergoing tests on a Cosmic-Ray Test Stand. UCLA is one of two U.S. University sites where CSC's produced at Fermilab are assembled with mechanical, cooling, cable and electronics components, mounted and tested.

Above- At CERN an installation test for CSC's is completed successfully, as the CSC is installed onto a completed CMS End-cap Disk. The University of Wisconsin designed the installation fixture used. The end-cap disk was also part of the U.S. CMS Common Projects contribution. ATLAS collaborators observed the test above in the interest of considering this system for ATLAS Muon System installation.



Left- The first Half-Barrel of the CMS Hadron Calorimeter (HCAL) is installed at CERN, in the CMS Surface Building SX-5. The top portion of the brass HCAL barrel is shown behind the scaffolding, before installation of the last (keystone) wedge in the top center of the arch. The U.S. CMS Project is responsible for the HCAL sub-system.

5.3 U.S LHC ACCELERATOR CONSTRUCTION PROJECT

LHC Accelerator- LHC cost overruns have become a major issue for CERN. Commissioning schedule important dates remain as follows: first octant test- 4/04; last dipole produced-4/05; rings cold-12/05; first beam-2/06; pilot run-4/06; shutdown-5-7/06; physics run-8/06. The LHC project is looking for ways to reduce the cost to complete, and CERN management is working with the CERN Council and Finance Committee to address the cost increases identified and maintain schedule.

- CERN PS-SPS accelerator complex is running for LHC beam studies; SPS has achieved four batches at half the nominal intensity and at the desired 25 ns LHC bunch spacing.
- LHC superconducting magnet contracts have been placed and many are going into full production, with the exception of dipoles; all dipole contract offers are in and adjudication may occur in December. Five pre-series dipoles (at least one from each firm) are undergoing testing.
- The second string test is in progress with a full half-cell of magnets. It has been powered to the nominal current (12KA) with the real LHC ramp on both the dipoles and quads.
- Superconducting cable production is staying barely ahead of requirements for magnet production- this critical path item is being closely monitored by LHC project management.

U.S. LHC Accelerator- As of September 30, 2001, the overall project was 68 percent complete versus the scheduled plan of 72 percent complete. A DOE/NSF Quarterly Status meeting was held at Fermilab on August 29, 2001 with the next DOE/NSF review scheduled for December 3-4, 2001 at Fermilab. The level of contingency available in the project has emerged as a minor concern, due to recently identified growth in costs associated with the latest estimate to complete. Project management is fully evaluating project scope and contingency across the entire project to increase the available contingency budget and has been succeeding. There are no major issues with technical progress and the schedule of deliverables remains well in advance of CERN requirements. Project highlights are listed below:

- [Fermilab] Prototype quadrupole testing was completed. This prototype met all requirements and data looked good. The first production coil was collared, warm measurements were successful and second coil production began. The first Q2 (two cold masses, Q2a and Q2b in one cryostat) will not be fully assembled until April '02 due to late delivery of beam tubes from CERN.
- [BNL] All five D1 magnets were completed. The first one began cryogenic tests, but quenched below LHC requirements. Indications are that coil cooling is inadequate due to the large diameter beam tube, 4.5K test temperature and presence of the warm bore used during testing. This should not be a problem in the LHC, where these magnets are cooled to 1.9K. One of the other D1 magnets is in repair after having fallen when a sling broke during the lift from the cryostating fixture. The first two D2 cold masses are essentially complete and are awaiting a vacuum vessel. Electro-mechanical assembly is under way on the third D2 cold mass.
- [LBNL] The DFBX detailed design is about 80% complete. Design work is focused on producing, checking and approving drawing packages for the eight DFBX. Detailed design of the IR absorbers is essentially complete and the design effort ramped down to a low level. Excellent progress was made in the quarter placing procurements for the TAN and TAS. The fraction of procurements placed increased from 17% to 77% during the quarter.

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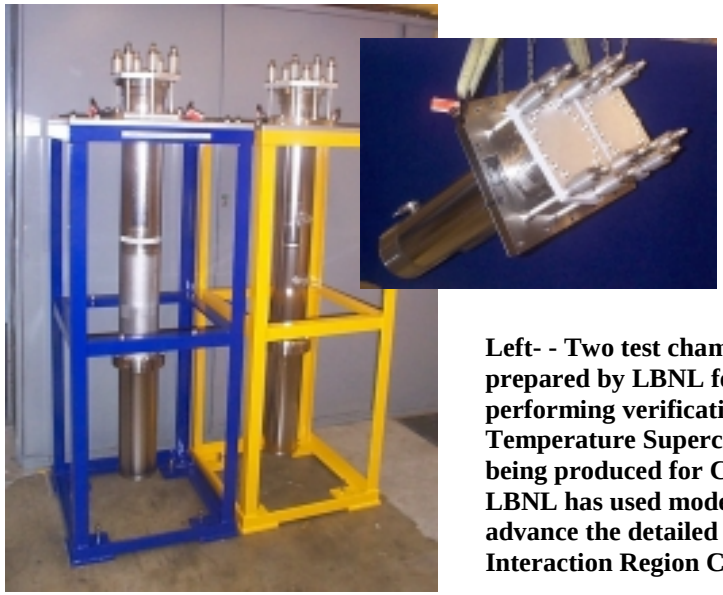
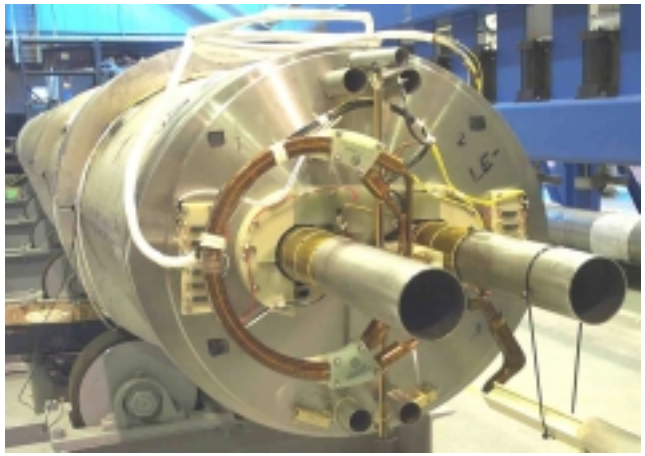


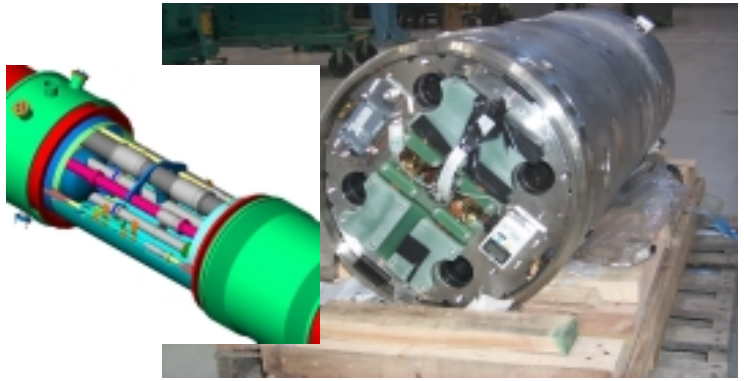
Left- - Two test chambers have been prepared by LBNL for use by industry in performing verification tests on High-Temperature Superconducting (HTS) leads being produced for CERN (inset above). LBNL has used models of the HTS lead to advance the detailed design of the Interaction Region Cryogenic Feedboxes.

Right- The second production Interaction Region Inner Triplet Quadrupole (MQXB02) coil and collar assembly is shown at Fermilab.

Below- A short model magnet from the KEK Laboratory in Japan arrived at Fermilab for use in working on magnet interfaces. KEK will provide one-half the quadrupoles (MQXA type) that Fermilab will incorporate into complete Interaction Region Inner Triplet assemblies.



Above- Interaction Region twin-aperture dipole magnet (D2) at BNL. Two D2 cold masses are complete, and the third (of eight to be built by BNL) is undergoing electro-mechanical assembly (stage shown above)



Above left (inset)- Computer generated design model of an Inner Triplet magnet interconnect region. The computer model is used by Fermilab and CERN to help resolve vacuum, cooling and mechanical design details related to the beam tube, instrumentation and other components.

CERN Direct Purchases - DOE reimburses CERN for their payments to qualified U.S. vendors [Reference U.S.-CERN Agreement and Accelerator Protocol]. The status is shown in Table 5.1.

Table 5.1, Status of DOE Payments (in $000)

Contract Item	Company (U.S. Supplier)	Amount	Contract Price	w/ options
Niobium-Titanium Alloy Bars	Wah Chang	19,404	38,667	48,431
Niobium Sheets	Wah Chang	2,898	5,633	6,951
Polyamide Insulation Film	Kaneka High Tech Materials	681	5,425	6,510
Superconducting Cable	Outokumpu-Advanced Superconductor[2]	1,151	16,447	20,985
LHC BPMS Button Feedthroughs	Ceramaseal	89	898	1,003
Cryogenic Temperature Sensor	Lakeshore	233		
Cryogenic Helium Mass	(tbd-contract in process)	0	1,200	1,200
(tbd-contract in process)	(tbd-contract in process)	0	(tbd)	3,134
Totals		24,456	68,270	88,214

6. FINANCIAL/COST STATUS AND PLANS

TOTAL PROJECT FUNDING PLAN (then year millions of dollars)[3]

Fiscal Year	FY96	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	Total
Machine Funding Profiles (DOE)											
US LHC Accelerator	2.00	6.67	14.00	15.40	24.92	19.16	10.10	8.70	6.13	2.92	110
CERN Direct	0.00	0.00	0.00	8.09	8.29	8.08	11.20	13.40	23.20	17.74	90
Machine Total	2.00	6.67	14.00	23.49	33.21	27.24	21.30	22.10	29.33	20.66	200
Detector Funding Profiles (DOE and NSF)											
US ATLAS	1.70	3.71	10.05	25.63	28.43	26.77	23.16	24.71	14.69	4.90	163.75
DOE	1.70	3.71	10.05	9.00	16.49	14.48	10.51	17.42	14.69	4.90	102.95
NSF	0.00	0.00	0.00	16.63	11.94	12.29	12.65	7.29	0.00	0.00	60.80
US CMS	2.30	4.61	10.95	38.03	24.26	21.25	21.40	22.91	15.98	5.56	167.25
DOE	2.30	4.61	10.95	32.51	20.30	17.15	17.19	20.48	15.98	5.56	147.03
NSF	0.00	0.00	0.00	5.52	3.96	4.10	4.21	2.43	0.00	0.00	20.22
Detectors Total	4.00	8.32	21.00	63.66	52.69	48.02	44.56	47.62	30.67	10.46	331.00

TOTAL DOE & NSF FUNDS, COSTS, & COMMITMENTS (cumulative $000)[4]

U.S. LHC Construction Project	A = Funds Allocated	B = Estimate Actual Costs	C = Open Commitments	D= B+C Total	A–D = Funds Available
U.S. ATLAS	96,290	73,021	4,925	77,946	18,344
U.S. CMS	101,390	76,563	15,512	92,075	9,315
U.S. LHC Accelerator	82,153	69,634	2,828	72,462	9,691
CERN Direct Purchases	24,460	24,456	0	24,456	4
Total	304,293	243,674	23,265	266,939	37,354

[2] Formerly IGC-Advanced Superconductor

[3] This report includes a revision to the funding profile for the U.S. LHC Construction Project that is addressed in the FY 2001 budget planning for DOE. The revision to the original profile was made in order to better match the needs of the construction projects. This report also includes a change in the distribution of funds between the U.S. LHC Accelerator project and the CERN direct project to address delays in CERN invoices.

[4] Based on financial reports from the U.S. LHC construction projects. NSF funding is provided after the beginning of the fiscal year and therefore it is necessary to carry-over funding into the subsequent fiscal years.

7. DOE/NSF COST BASELINES AT LEVEL 2 (in $000)

U.S. ATLAS Cost Baseline

WBS	Description	Previous	Change	Current
1.1	Silicon System	17,755	45	17,795
1.2	Transition Radiation Tracker	9,194	0	9,194
1.3	Liquid Argon Calorimeter	42,171	1,600	43,771
1.4	Tile Calorimeter	9,148	142	9,290
1.5	Muon Spectrometer	26,391	0	26,391
1.6	Trigger/Data Acquisition System	10,957	0	10,957
1.7	Common Projects	9,179	0	9,179
1.8	Education	287	0	287
1.9	Project Management	8,280	0	8,280
1.10	Technical Coordination	450	0	450
	Contingency	29,938	-1,782	28,156
	U.S. ATLAS Total Project Cost Baseline	163,750	0	163,750

U.S. CMS Cost Baseline

WBS	Description	Previous	Change	Current
1.1	Endcap Muon	36,063	- 212	35,851
1.2	Hadron Calorimeter	38,442	701	39,143
1.3	Trigger and Data Acquisition	13,741	- 2,089	11,652
1.4	Electromagnetic Calorimeter	9,930	1,871	11,801
1.5	Forward Pixels	6,756	28	6,784
1.6	Common Projects	23,000	0	23,000
1.7	Project Office	7,569	23	7,592
1.8	Silicon	3,325	17	3,342
	Contingency	28,424	- 339	28,085
	U.S. CMS Total Project Cost Baseline	167,250	0	167,250

U.S. LHC Accelerator Cost Baseline

WBS	Description	Previous	Change	Current
1.1	Interaction Region Components	55,107	1,047	56,154
1.2	Radio Frequency Straight Section	17,148	0	17,148
1.3	Superconducting Wire and Cable	13,326	- 101	13,225
1.4	Accelerator Physics	4,077	- 471	3,606
1.5	Project Management	13,538	157	13,695
	Contingency	6,804	- 632	6,172
	U.S. LHC Accelerator Total Project Cost Baseline	110,000	0	110,000

8. SCHEDULE STATUS AND PLANS

8.1 U.S. ATLAS Construction Project Milestones

The milestones have been updated with the new ETC baseline dates.

U.S. ATLAS Major Project Milestones (Level 1)

Description	Baseline Schedule	Forecast (F) Date	Actual (A) Date
Project Start	01-Oct-95	01-Oct-95 (F)	01-Oct-95 (A)
Project Completion	30-Sep-05	30-Sep-05 (F)	

U.S. ATLAS Major Project Milestones (Level 2)

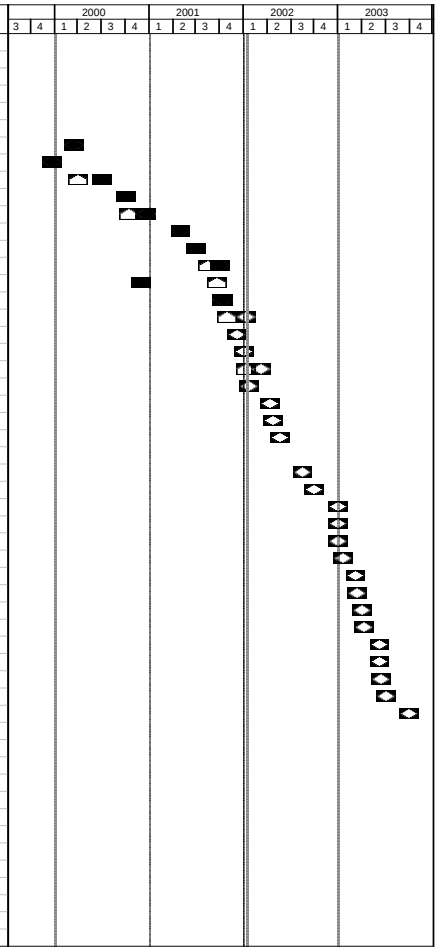
Subsystem	**Schedule Designator**	**Description**	**Baseline Schedule**	**Forecast (F) / Actual (A) Date**
Silicon (1.1)	SIL L2/1	Start Full Silicon Strip Electronics Production	06-Jul-01	15-Jul-01 (A)
	SIL L2/2	Start Full Strip Module Production	07-Jan-02	07-Jan-02 (F)
	SIL L2/3	ROD Design Complete	01-Oct-01	01-Oct-01 (F)
	SIL L2/4	Complete Shipment of Silicon Strip Module Production	13-Oct-03	13-Oct-03 (F)
	SIL L2/5	ROD Production/Testing Complete	24-Jun-03	24-Jun-03 (F)
	SIL L2/6	Pixels 1st IBM Prototype Submitted	26-Jul-01	**08-Oct-01 (F)**
	SIL L2/7	Pixels Start IBM Production	13-Mar-03	13-Mar-03 (F)
	SIL L2/8	Pixels Start IBM Outer Bare Module Prod	22-Oct-03	22-Oct-03 (F)
	SIL L2/9	Pixels Disk System at CERN	13-Oct-04	13-Oct-04 (F)
TRT (1.2) Mechanical	TRT L2/1	Final Design Complete	31-Dec-98	07-Dec-98 (A)
	TRT L2/2	Module Production Complete (CUM 102)	31-Mar-03	31-Mar-03 (F)
	TRT L2/3	Barrel Construction Complete	16-Sep-03	16-Sep-03 (F)
Electrical	TRT L2/4	Select Final Elec Design	15-Jun-01	30-Aug-00 (A)
	TRT L2/5	Start Production of ASICS	18-Jan-02	18-Jan-02 (F)
	TRT L2/6	Installation Complete	04-Jan-05	04-Jan-05 (F)
LAr Cal (1.3)	LAr L2/1	Cryostat Contract Award	24-Jul-98	05-Aug-98 (A)
	LAr L2/2	Barrel Feedthroughs Final Design Review	30-Sep-98	02-Oct-98 (A)
	LAr L2/3	Start Electronics Production (Preamps)	30-Jun-00	30-Jun-00 (A)
	LAr L2/4	FCAL Mechanical Design Complete	14-Dec-98	15-Dec-99 (A)
	LAr L2/6	Level 1 Trigger Final Design Complete	04-Oct-01	**04-Dec-01 (F)**
	LAr L2/7	ROD Final Design Complete	12-Dec-02	12-Dec-02 (F)
	LAr L2/8	Motherboard System Production Complete	30-Jun-02	30-Jun-02 (F)
	LAr L2/9	Cryostat Arrives at CERN	15-May-01	02-Jul-01 (A)
	LAr L2/10	Barrel Feedthroughs Production Complete	15-Feb-02	15-Feb-02 (F)
	LAr L2/11	FCAL-C Delivered to EC	17-Oct-02	17-Oct-02 (F)
	LAr L2/12	FCAL-A Delivered to EC	08-Dec-03	08-Dec-03 (F)

U.S. ATLAS Major Project Milestones (Level 2) (Continued)

Subsystem	Schedule Designator	Description	Baseline Schedule	Forecast (F) / Actual (A) Date
Tile Cal (1.4)	Tile L2/1	Start Submodule Procurement	01-Sep-97	01-Sep-97 (A)
	Tile L2/2	Technology Choice for F/E Electronics	15-Nov-97	15-Nov-97 (A)
	Tile L2/3	Start Module Construction	01-May-99	20-Sep-99 (A)
	Tile L2/4	Start Production of Motherboards	01-Apr-01	30-Mar-01 (A)
	Tile L2/5	All Electronic Components Delivered to CERN	01-Oct-02	01-Oct-02 (F)
	Tile L2/6	Module Construction Complete	30-Sept-02	30-Sep-02 (F)
	Tile L2/7	All Modules Delivered to CERN	02-Dec-02	02-Dec-02 (F)
Muon (1.5)	Muon L2/1	Start MDT Chambers Lines 1 and 3	17-Jul-00	15-Sep-00 (A)
	Muon L2/2	Start CSC Chamber Production	01-Sep-01	01-Sep-01 (A)
	Muon L2/3	MDT Electronics ASD PRR	19-Oct-01	01-Oct-01 (F)
	Muon L2/4	Final Design of Global Alignment Devices Complete	01-Apr-02	01-Apr-02 (F)
	Muon L2/5	CSC IC Production Complete	15-May-02	15-May-02 (F)
	Muon L2/6	Kinematic Mount Design Complete	30-Jan-01	30-Jan-01 (A)
	Muon L2/7	MDT Chambers (U.S.) Production Complete	27-Aug-04	14-Sep-04 (F)
	Muon L2/8	Kinematic Mount Production Complete	24-May-04	24-May-04 (F)
	Muon L2/9	CSC ROD Production Complete	05-Nov-03	05-Nov-03 (F)
	Muon L2/10	MDT Elec.'s Mezzanine Production Complete	06-Mar-03	06-Mar-03 (F)
	Muon L2/11	CSC Assembly/Testing at CERN Complete	17-Dec-04	17-Dec-04 (F)
	Muon L2/12	Global Alignment System Final Delivery	30-Sep-04	30-Sep-04 (F)
Trigger/ DAQ (1.6)	TDAQ L2/1	Select Final LVL2 Architecture	31-Dec-99	31-Mar-00 (A)
	TDAQ L2/2	LVL2 Trigger Design Complete	31-Dec-02	31-Dec-02 (F)
	TDAQ L2/3	LVL2 Trigger Prototype Complete	30-Sep-02	30-Sep-02 (F)
	TDAQ L2/4	Start Production	08-Jan-03	08-Jan-03 (F)
	TDAQ L2/5	Start Installation & Commissioning	05-Mar-03	05-Mar-03 (F)
	TDAQ L2/6	Production Complete	30-Jul-05	30-Jul-05 (F)
	TDAQ L2/7	LVL2 Installation & Commissioning Complete	30-Sep-05	30-Sep-05 (F)

Figure 8.1.1 - Milestone Schedule Status Report

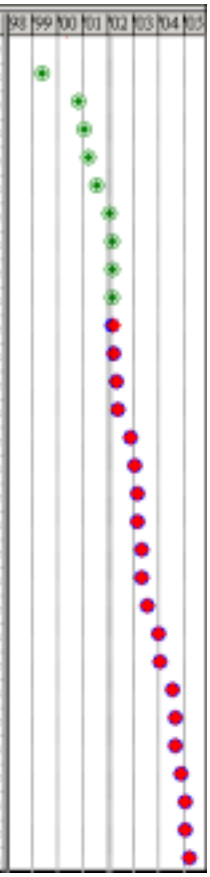
ID	Subsystem ID	Milestone	ETC 01 Baseline	Forecast	Actual
1		Project Start (10/1/95)	Sun 10/1/95	Sun 10/1/95	Sun 10/1/95
2	Tile L2/1	Start Submodule Procurement	Mon 9/1/97	Mon 9/1/97	Mon 9/1/97
3	Tile L2/2	Technology Choice for F/E Electronics	Sat 11/15/97	Sat 11/15/97	Sat 11/15/97
4	LAr L2/1	Cryostat Contract Award	Fri 7/24/98	Wed 8/5/98	Wed 8/5/98
5	LAr L2/2	Barrel FTs Final Design Review	Wed 9/30/98	Fri 10/2/98	Fri 10/2/98
6	TRT L2/1	Final Design Complete	Thu 12/31/98	Mon 12/7/98	Mon 12/7/98
7	LAr L2/4	FCAL Mech Design Complete	Mon 12/14/98	Wed 12/15/99	Wed 12/15/99
8	Tile L2/3	Start Module Construction	Sat 5/1/99	Mon 9/20/99	Mon 9/20/99
9	TDAQ L2/1	Select Final LVL2 Architecture	Fri 12/31/99	Fri 3/31/00	Fri 3/31/00
10	LAr L2/3	Start Elec.'s Production (Preamps)	Fri 6/30/00	Fri 6/30/00	Fri 6/30/00
11	Muon L2/1	Start MDT Chambers Lines 1 & 3	Mon 7/17/00	Fri 9/15/00	Fri 9/15/00
12	Muon L2/6	Kinematic Mount Design Complete	Tue 1/30/01	Tue 1/30/01	Tue 1/30/01
13	Tile L2/4	Start Production of MBs	Sun 4/1/01	Fri 3/30/01	Fri 3/30/01
14	LAr L2/9	Cryostat Arrives at CERN	Tue 5/15/01	Mon 7/2/01	Mon 7/2/01
15	TRT L2/4	Select Final Elec Design	Fri 6/15/01	Wed 8/30/00	Wed 8/30/00
16	Sil L2/1	Start Full Silicon Strip Elec Production	Fri 7/6/01	Sun 7/15/01	Sun 7/15/01
17	Sil L2/6	Pixels '1st IBM Prototype Submitted'	Thu 7/26/01	**Mon 10/8/01**	NA
18	Muon L2/2	Start CSC Chamber Production	Sat 9/1/01	Sat 9/1/01	NA
19	Sil L2/3	ROD Design Complete	Mon 10/1/01	Mon 10/1/01	NA
20	LAr L2/6	Level 1 Trigger Final Design Complete	Thu 10/4/01	**Tue 12/4/01**	NA
21	Muon L2/3	MDT Electronics ASD PRR	Fri 10/19/01	Fri 10/19/01	NA
22	Sil L2/2	Start Full Strip Module Production	Mon 1/7/02	Mon 1/7/02	NA
23	TRT L2/5	Start Production of ASICS	Fri 1/18/02	Fri 1/18/02	NA
24	LAr L2/10	Barrel FTs Production Complete	Fri 2/15/02	Fri 2/15/02	NA
25	Muon L2/4	Final Design of Global Align Devices	Mon 4/1/02	Mon 4/1/02	NA
26	Muon L2/5	CSC IC Production Complete	Wed 5/15/02	Wed 5/15/02	NA
27	LAr L2/8	MB System Production Complete	Sun 6/30/02	Sun 6/30/02	NA
28	TDAQ L2/3	LVL2 Trigger Prototype Complete	Mon 9/30/02	Mon 9/30/02	NA
29	Tile L2/6	Module Construction Complete	Mon 9/30/02	Mon 9/30/02	NA
30	Tile L2/5	All Elec.'s Components Delivered to ATLAS	Tue 10/1/02	Tue 10/1/02	NA
31	LAr L2/11	FCAL-C Delivered to EC	Thu 10/17/02	Thu 10/17/02	NA
32	Tile L2/7	All Modules Delivered to CERN	Mon 12/2/02	Mon 12/2/02	NA
33	LAr L2/7	ROD Final Design Complete	Thu 12/12/02	Thu 12/12/02	NA
34	TDAQ L2/2	LVL2 Trigger Design Complete	Tue 12/31/02	Tue 12/31/02	NA
35	TDAQ L2/4	Start Production	Wed 1/8/03	Wed 1/8/03	NA
36	TDAQ L2/5	Start Installation & Commissioning	Wed 3/5/03	Wed 3/5/03	NA
37	Muon L2/10	MDT Elec.'s Mezz Production Complete	Thu 3/6/03	Thu 3/6/03	NA
38	Sil L2/7	Pixels 'Start IBM Production'	Thu 3/13/03	Thu 3/13/03	NA
39	TRT L2/2	Module Production Complete (CUM 102)	Mon 3/31/03	Mon 3/31/03	NA
40	Sil L2/5	ROD Production/Testing Complete	Tue 6/24/03	Tue 6/24/03	NA
41	TRT L2/3	Barrel Construction Complete	Tue 9/16/03	Tue 9/16/03	NA
42	Sil L2/4	Compl Shipment of Silicon Strip Modules Prod	Mon 10/13/03	Mon 10/13/03	NA
43	Sil L2/8	Pixels 'Start IBM Outer Bare Module Prod'	Wed 10/22/03	Wed 10/22/03	NA
44	Muon L2/9	CSC ROD Production Complete	Wed 11/5/03	Wed 11/5/03	NA
45	LAr L2/12	FCAL-A Delivered to EC	Mon 12/8/03	Mon 12/8/03	NA
46	Muon L2/8	Kinematic Mount Production Complete	Mon 5/24/04	Mon 5/24/04	NA
47	Muon L2/7	MDT Chambers (U.S.) Prod Compl (Qty. 240)	Fri 8/27/04	Tue 9/14/04	NA
48	Muon L2/12	Global Align System Final Delivery	Thu 9/30/04	Thu 9/30/04	NA
49	Sil L2/9	Pixels 'Disk System at CERN'	Wed 10/13/04	Wed 10/13/04	NA
50	Muon L2/11	CSC Assembly/Test at CERN Complete	Fri 12/17/04	Fri 12/17/04	NA
51	TRT L2/6	Installation Complete	Tue 1/4/05	Tue 1/4/05	NA
52	TDAQ L2/6	Production Complete	Sat 7/30/05	Sat 7/30/05	NA
53	TDAQ L2/7	Installation & Commissioning Complete	Fri 9/30/05	Fri 9/30/05	NA



8.2 U.S. CMS Construction Project Milestones

DOE/NSF Project Manager and FNAL Deputy Director milestones are under Change Control as described in the US CMS PMP. Any 3 month change in a APM/DD milestone requires the signatures of both the DOE/NSF Project Manager and FNAL Deputy Director for approval.

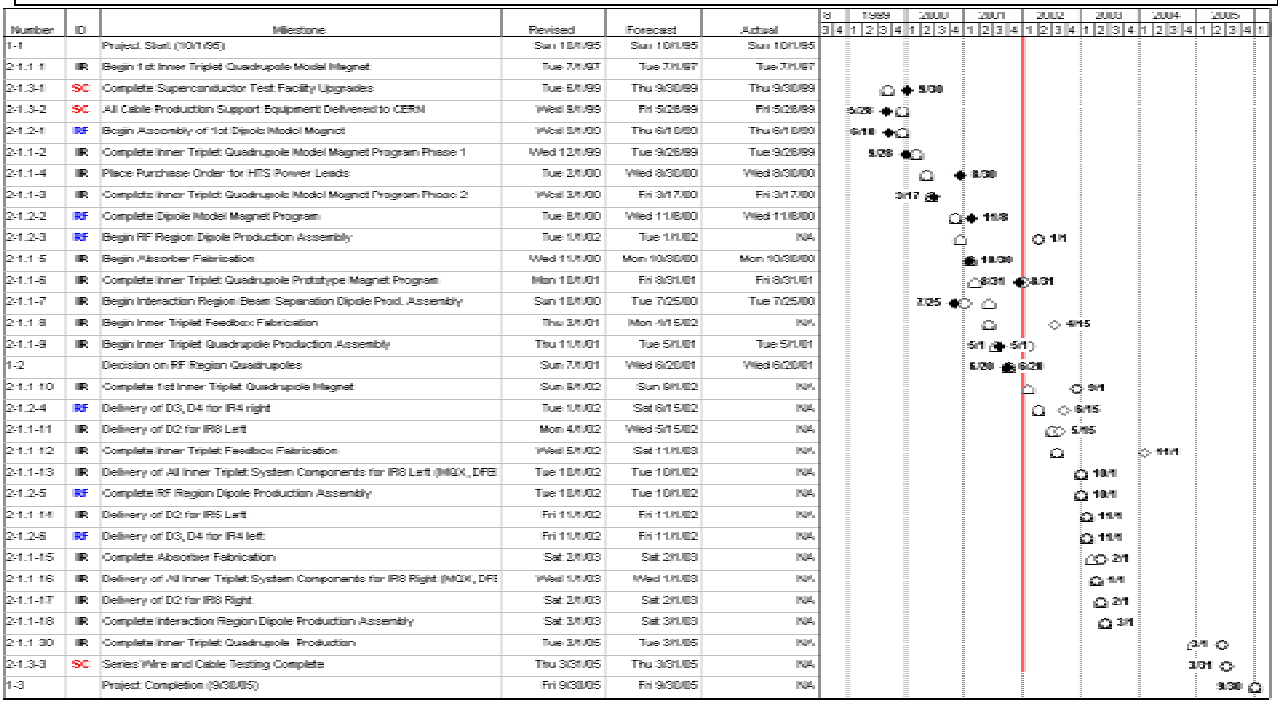
System	Level?	CMS ID	Milestone	v27 Baseline	v31 Baseline	Start	Variance
			APM/DD Milestones	**NA**	**NA**	**Dec 31 '97**	**0 days**
HCAL	ML3*	HB-024	HB: Start Optics Production	Jan 31 '99	Jan 31 '99	Jan 31 '99	0 days
MUON	ML2*	M-011	Begin Assembly of Cathode Strip Chambers at FNAL	Oct 31 '99	Jul 14 '00	Jul 14 '00	0 days
HCAL	ML3*	HB-026	HB-1 Optical Assemblies 100% Complete	Jul 31 '00	Sep 30 '00	Sep 30 '00	0 days
HCAL	ML2*	HB-010	HB-1 Absorber Delivered to CERN	Nov 30 '00	Nov 30 '00	Nov 30 '00	0 days
MUON	ML2*	M-013	Begin Mass Production of Electronics Boards	Aug 31 '00	Mar 31 '01	Mar 31 '01	0 days
HCAL	ML2*	HB-014	HB+1 Absorber Delivered to CERN	Dec 31 '01	Sep 30 '01	Sep 30 '01	0 days
HCAL	ML1*	HB-016	HB-1 End Module Assembly in SX5	NA	Oct 31 '01	Oct 31 '01	0 days
HCAL	ML3*	HL-039	HF: Start PMT Procurement	Oct 31 '01	Oct 31 '01	Oct 31 '01	0 days
SiTrkr	ML2*	T-027	Begin Sensor Module Construction (for M200)	NA	Oct 31 '01	Oct 31 '01	0 days
CP	ML3*	S-059	End Assembly of YE+3	Oct 31 '01	Oct 31 '01	Nov 30 '01	22 days
MUON	ML2*	M-014	Begin Mounting Electronics and Testing at UCLA/UF	Sep 30 '00	Nov 30 '01	Nov 30 '01	0 days
HCAL	ML3*	HB-029	HB+1 Optical Assemblies 100% Complete	Dec 31 '01	Dec 31 '01	Dec 31 '01	0 days
HCAL	ML3*	HL-005	Start HPD Procurement	Oct 31 '99	Jan 31 '02	Jan 31 '02	0 days
SiTrkr	ML2*	T-1070	25% of Rods Complete	NA	Jul 31 '02	Jul 31 '02	0 days
HCAL	ML2*	HL-011	HF: PMT Tests 100% Complete	NA	Sep 30 '02	Sep 30 '02	0 days
HCAL	ML1*	HB-017	End Assembly of HB+ (Barrel) in SX5	Jul 31 '02	Oct 31 '02	Oct 31 '02	0 days
ECAL	ML3*	E-027	ECAL Front-End Electronics Production Launched	Apr 30 '00	Oct 31 '02	Oct 31 '02	0 days
HCAL	ML3*	HL-014	QIE ASIC Production Run Complete	NA	Dec 31 '02	Dec 31 '02	0 days
FPIX	ML2*	T-1002	Final Full Size ROC Submission(0.25micron)	NA	Dec 31 '02	Dec 31 '02	0 days
HCAL	ML2*	HL-002	HCAL Front-End Electronics Production Complete	Jun 30 '01	Mar 31 '03	Mar 31 '03	0 days
HCAL	ML2*	HL-018	HCAL HPD Tests 100% Complete	NA	Aug 31 '03	Aug 31 '03	0 days
MUON	ML2*	M-017	All 148 ME23/2 CSC's Delivered from UC/UF to CERN	Oct 31 '03	Sep 30 '03	Sep 30 '03	0 days
FPIX	ML2*	T-1015	First Butterfly Ready	NA	Mar 31 '04	Mar 31 '04	0 days
ECAL	ML3*	E-045	All APDs Delivered	Feb 28 '04	Apr 30 '04	Apr 30 '04	0 days
SiTrkr	ML2*	T-1077	Delivery of TOB to the Tracker	NA	Apr 30 '04	Apr 30 '04	0 days
DAQ	ML2*	D-1014	Start of Readout and EVB Commissioning	NA	Jul 31 '04	Jul 31 '04	0 days
ECAL	ML3*	E-046	ECAL Front-End Electronics Production Complete	May 31 '04	Sep 30 '04	Sep 30 '04	0 days
CP	ML1*	O-1010	UX Ready (Start Lowering Magnet Parts)	NA	Sep 30 '04	Sep 30 '04	0 days
TRIG	ML3*	D-1350	CSC MPC Prod Test Complete	NA	Nov 30 '04	Nov 30 '04	0 days



8.3 U.S. LHC Accelerator Construction Project Milestones

Table 8.3 Level 1 and 2 U.S. LHC Accelerator Baseline Milestones through FY2002.

WBS Identifiers	Milestone Description	Baseline Date	Forecast(F) or Actual(A)
Project	Decision as to whether or not the US Project includes RF region quadrupoles	1 Jul 01	20 Jun 01 (A)
Int Region	Begin 1st inner triplet quadrupole model magnet	1 Jul 97	1 Jul 97 (A)
Int Region	Complete inner triplet quadrupole model magnet program phase 1	1 Dec 99	28 Sep 99 (A)
Int Region	Complete inner triplet quadrupole model magnet program phase 2	1 Mar 00	17 Mar 00 (A)
Int Region	Place purchase order for HTS power leads	1 Feb 00	30 Aug 00 (A)
Int Region	Begin absorber fabrication	1 Nov 00	30 Oct 00 (A)
Int Region	Complete inner triplet quadrupole prototype program	1 Oct 01	**31 Aug 01 (A)**
Int Region	Begin IR beam separation dipole production assembly	1 Oct 00	25 Jul 00 (A)
Int Region	Begin inner triplet feedbox fabrication	1 Mar 01	**15 Apr 02 (F)**
Int Region	Begin inner triplet quadrupole production assembly	1 Nov 01	1 May 01 (A)
Int Region	Complete 1st inner triplet quadrupole magnet	1 Sep 02	1 Sep 02 (F)
Int Region	Delivery of D2 for IR8 left	1 Apr 02	**15 May 02 (F)**
Int Region	Complete inner triplet feedbox fabrication	1 May 02	1 Nov 03 (F)
RF Region	Begin assembly of 1st dipole model magnet	1 Sep 99	10 Jun 99 (A)
RF Region	Complete dipole model magnet program	1 Aug 00	8 Nov 00 (A)
RF Region	Begin RF region dipole production assembly	1 Jan 02	1 Jan 02 (F)
RF Region	Delivery of D3, D4 for IR4 right	1 Jan 02	**15 Jun 03 (F)**
SC Cable	All cable prod. support equipment delivered to CERN	1 Sep 99	28 May 99 (A)
SC Cable	Complete SC testing facility upgrades	1 Jun 99	30 Sep 99 (A)



Number	ID	Milestone	Revised	Forecast	Actual
1-1		Project Start (10/1/95)	Sun 10/1/95	Sun 10/1/95	Sun 10/1/95
2-1.1.1	IR	Begin 1st Inner Triplet Quadrupole Model Magnet	Tue 7/1/97	Tue 7/1/97	Tue 7/1/97
2-1.3-1	SC	Complete Superconductor Test Facility Upgrades	Tue 6/1/99	Thu 9/30/99	Thu 9/30/99
2-1.3-2	SC	All Cable Production Support Equipment Delivered to CERN	Wed 5/1/99	Fri 5/28/99	Fri 5/28/99
2-1.2-1	RF	Begin Assembly of 1st Dipole Model Magnet	Wed 5/1/00	Thu 6/1/00	Thu 6/1/00
2-1.1-2	IR	Complete Inner Triplet Quadrupole Model Magnet Program Phase 1	Wed 12/1/99	Tue 9/26/99	Tue 9/26/99
2-1.1-4	IR	Place Purchase Order for HTS Power Leads	Tue 2/1/00	Wed 8/30/00	Wed 8/30/00
2-1.1-3	IR	Complete Inner Triplet Quadrupole Model Magnet Program Phase 2	Wed 3/1/00	Fri 3/17/00	Fri 3/17/00
2-1.2-2	RF	Complete Dipole Model Magnet Program	Tue 8/1/00	Wed 11/8/00	Wed 11/8/00
2-1.2-3	RF	Begin RF Region Dipole Production Assembly	Tue 1/1/02	Tue 1/1/02	NA
2-1.1-5	IR	Begin Absorber Fabrication	Wed 11/1/00	Mon 10/30/00	Mon 10/30/00
2-1.1-6	IR	Complete Inner Triplet Quadrupole Prototype Magnet Program	Mon 10/1/01	Fri 8/31/01	Fri 8/31/01
2-1.1-7	IR	Begin Interaction Region Beam Separation Dipole Prod. Assembly	Sun 10/1/00	Tue 7/25/00	Tue 7/25/00
2-1.1-8	IR	Begin Inner Triplet Feedbox Fabrication	Thu 3/1/01	Mon 4/1/02	NA
2-1.1-9	IR	Begin Inner Triplet Quadrupole Production Assembly	Thu 11/1/01	Tue 5/1/01	Tue 5/1/01
1-2		Decision on RF Region Quadrupoles	Sun 7/1/01	Wed 6/20/01	Wed 6/20/01
2-1.1-10	IR	Complete 1st Inner Triplet Quadrupole Magnet	Sun 9/1/02	Sun 9/1/02	NA
2-1.2-4	RF	Delivery of D3, D4 for IR4 right	Tue 1/1/02	Sat 6/1/02	NA
2-1.1-11	IR	Delivery of D2 for IR8 Left	Mon 4/1/02	Wed 5/1/02	NA
2-1.1-12	IR	Complete Inner Triplet Feedbox Fabrication	Wed 5/1/02	Sat 11/1/03	NA
2-1.1-13	IR	Delivery of All Inner Triplet System Components for IR8 Left (MQX, DFB	Tue 10/1/02	Tue 10/1/02	NA
2-1.2-5	RF	Complete RF Region Dipole Production Assembly	Tue 10/1/02	Tue 10/1/02	NA
2-1.1-14	IR	Delivery of D2 for IR5 Left	Fri 11/1/02	Fri 11/1/02	NA
2-1.2-6	RF	Delivery of D3, D4 for IR4 left	Fri 11/1/02	Fri 11/1/02	NA
2-1.1-15	IR	Complete Absorber Fabrication	Sat 2/1/03	Sat 2/1/03	NA
2-1.1-16	IR	Delivery of All Inner Triplet System Components for IR8 Right (MQX, DFB	Wed 1/1/03	Wed 1/1/03	NA
2-1.1-17	IR	Delivery of D2 for IR8 Right	Sat 2/1/03	Sat 2/1/03	NA
2-1.1-18	IR	Complete Interaction Region Dipole Production Assembly	Sat 3/1/03	Sat 3/1/03	NA
2-1.1-30	IR	Complete Inner Triplet Quadrupole Production	Tue 3/1/05	Tue 3/1/05	NA
2-1.3-3	SC	Series Wire and Cable Testing Complete	Thu 3/31/05	Thu 3/31/05	NA
1-3		Project Completion (9/30/05)	Fri 9/30/05	Fri 9/30/05	NA

9. TECHNICAL BASELINE STATUS

U.S. ATLAS Construction Project - No change. The U.S. ATLAS collaboration defined a list of initial deliverables representing the U.S. contribution to ATLAS. This list was approved by the JOG in March 1998. Deliverables are listed in the U.S. ATLAS Construction Project Management Plan, Appendix 3.

U.S. CMS Construction Project - Change to incorporate expanded U.S. CMS participation in the CMS Silicon Tracker Outer Barrel, per approved Level 2 Change Request defining additional associated deliverables, milestones, cost and schedule. The U.S. CMS collaboration defined a list of deliverables representing the U.S. contribution to CMS. This list was approved by the JOG in October 1998. The scope of U.S. CMS contribution is described in the U.S. CMS Management Plan, Appendix 2.

U.S. LHC Accelerator Construction Project - No change. The U.S. deliverables to CERN are defined in the Implementing Arrangement to the Accelerator Protocol. The Implementing Arrangement was signed by the CERN and U.S. signatories in July 1998. Reference the U.S. LHC Accelerator Project Management Plan, Annex II, (Approved 6/15/98).

CERN Direct Purchases - No change. CERN will procure from U.S. industrial firms supplies required to construct the LHC accelerator. These supplies will include superconducting alloy, cable, insulation, and other materials.

10. BASELINE CHANGE ACTIVITY

Baseline Control Level	Baseline Changes
Level 1, DOE/NSF Joint Oversight Group	No changes this quarter
Level 2, DOE/NSF Project Office	
U.S. ATLAS	Changes to the Level 2 cost, scope and schedule baseline.
U.S. CMS	Changes to the Level 2 cost, scope and schedule baseline.
U.S. LHC Accelerator	Changes to the Level 2 cost, scope and schedule baseline.

Project Manager's Quarterly Progress Report –4thQuarter FY 2001
U.S. Large Hadron Collider Construction Project

APPENDIX A - FUNDING BY INSTITUTION (in thousands of dollars)

U.S. CMS Construction Project

	FY 1998				FY 1999				FY 2000				FY 2001				
	DOE				DOE				DOE				DOE				Grand
Institution	Grant	Contract	NSF	Total	Grant	Contract	NSF	Total	Grant	Contract	NSF	Total	Grant	Contract	NSF	Total	Total
FNAL	0	5,517	0	5,517	0	10,817	40	10,857	0	5,981	0	5,981	0	6,033	0	6,033	28,388
Fairfield	0	29	0	29	0	0	0	0	0	10	0	10	0	13	0	13	52
Maryland	90	65	0	155	0	132	131	263	0	250	0	250	0	189	0	189	857
Boston U.	0	32	0	32	31	111	0	142	0	132	0	132	0	88	0	88	394
Florida State	60	54	0	114	71	118	0	189	80	54	0	134	68	43	0	111	548
U. of Minnesota	60	95	0	155	161	452	0	613	141	202	0	343	153	401	0	554	1,665
U. of Iowa	77	62	0	139	20	5	0	25	0	453	0	453	0	843	0	843	1,460
U. of Rochester	127	1,159	0	1,286	262	485	0	747	441	253	0	694	464	143	0	607	3,334
Notre Dame	0	52	0	52	0	44	184	228	0	14	193	207	0	14	112	126	613
Purdue	38	135	0	173	49	166	0	215	0	175	0	175	0	89	0	89	652
U. of Miss.	46	100	0	146	68	91	0	159	69	108	0	236	0	235	0	235	776
U. of Florida	44	95	0	139	184	412	0	596	332	853	0	1,185	432	293	0	725	2,645
Ohio State U.	140	64	0	204	275	212	0	487	196	732	0	928	151	700	0	851	2,470
Carnegie Mellon	0	113	0	113	0	291	0	291	0	312	0	312	0	258	0	258	974
Rice	138	19	0	157	102	56	0	158	132	16	0	148	196	36	0	232	695
U. of Wisconsin	533	1,052	0	1,585	471	3,598	0	4,069	722	2,995	0	3,717	504	4,489	0	4,993	14,364
U.C. Davis	34	100	0	134	0	78	0	78	0	502	0	502	0	63	0	63	777
UCLA	150	87	0	237	249	173	0	422	244	391	0	635	347	546	42	935	2,229
U.C. Riverside	20	10	0	30	0	164	0	164	0	70	0	70	0	72	0	72	336
John Hopkins	0	29	0	29	0	0	70	70	0	0	40	40	0	0	5	5	144
Northwestern	0	59	0	59	5	26	0	31	0	114	0	114	0	39	0	39	243
Rutgers	0	13	0	13	0	0	34	34	0	2	140	142	0	0	101	101	290
Princeton	0	256	0	256	0	626	0	626	0	667	0	667	0	133	0	133	1,682
Caltech	0	148	0	148	0	458	0	458	0	367	0	367	0	452	0	452	1,425
U.C. San Diego	11	0	0	11	11	90	24	125	36	0	0	36	0	43	0	43	215
Northeastern	0	0	0	0	0	0	3,370	3,370	0	0	1,741	1,741	0	0	1,482	1,482	6,593
U. Ill.-Chicago	0	0	0	0	0	0	124	124	0	0	309	309	0	0	262	262	695
U. of Nebraska	0	0	0	0	0	0	24	24	0	0	2	2	0	0	100	100	126
MIT	0	37	0	37	15	67	0	82	0	78	0	78	0	87	0	87	284
Iowa State	0	0	0	0	0	0	19	19	0	356	0	356	0	29	0	29	404
Kansas State													0	66	0	66	66
LBL													0	554	0	554	554
Texas Tech													0	876	0	876	876
UC Santa Barbara													0	13	0	13	13
U. of Kansas													0	0	6	6	6
Subtotal	1,568	9,382	0	10,950	1,974	18,672	4,020	24,666	2,393	15,087	2,425	19,964	2,315	16,840	2,110	21,265	75,330

APPENDIX B - FUNDING BY INSTITUTION (in thousands of dollars)

U.S. ATLAS Construction Project																	
	FY 1998				FY 1999				FY 2000				FY 2001				
	DOE				DOE				DOE				DOE				Grand
Institution	Grant	Contract	NSF	Total	Grant	Contract	NSF	Total	Grant	Contract	NSF	Total	Grant	Contra	NSF	Total	Total
ANL	0	1,098	0	1,098	0	967	0	967	0	922	0	922	0	172	0	172	3,159
BNL	0	3,903	0	3,903	0	2,581	0	2,581	0	6,429	0	6,429	0	6,630	0	6,630	19,543
LBNL	0	633	0	633	0	715	0	715	0	420	0	420	0	1,575	0	1,575	3,343
SUNY/Albany	20	0	0	20	48	0	0	48	50	0	0	50	0	0	0	0	118
U. of Arizona	320	100	0	420	634	0	0	634	557	0	0	557	298	0	0	298	1,909
Boston U.	224	0	0	224	298	0	0	298	287	0	0	287	155	0	0	155	964
Brandeis U.	265	45	0	310	0	0	593	593	0	0	478	478	0	0	731	731	2,112
U.C.Irvine	193	0	0	193	0	0	93	93	0	0	0	0	0	0	266	266	552
U.C. Santa Cruz	404	0	0	404	63	0	0	63	0	0	568	568	0	0	2,702	2,702	3,107
U. of Chicago	0	54	0	54	0	0	1,069	1,069	0	0	264	264	0	0	723	723	2,110
Duke U.	190	0	0	190	601	0	0	601	417	0	0	417	501	0	0	501	1,709
Hampton U.	0	0	0	0	0	0	538	538	0	0	293	293	0	0	331	331	1,162
Harvard	234	0	0	234	0	0	654	654	0	0	390	390	0	0	3,882	3,882	5,070
U. of Illinois	50	159	0	209	347	0	0	347	294	0	0	294	76	0	0	76	926
Indiana U.	190	0	0	190	765	0	0	765	460	0	0	460	0	616	0	616	2,031
MIT	50	0	0	50	105	0	0	105	177	0	0	177	190	0	0	190	522
Michigan State	0	35	0	35	0	0	178	178	0	0	293	293	0	0	0	0	506
Nevis/Columbia	0	675	0	675	0	0	2,680	2,680	0	0	1,422	1,422	0	0	103	103	4,880
U. of New Mex.	20	0	0	20	30	0	0	30	24	0	0	24	0	80	0	80	154
Northern Illinois	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ohio State U.	0	0	0	0	100	0	0	100	45	0	0	45	0	0	0	0	145
U. of Michigan	62	254	0	316	716	0	0	716	518	0	0	518	681	0	0	681	2,231
U. of Oklahoma	30	0	0	30	0	0	41	41	0	0	51	51	0	0	49	0	171
U. of Penn.	250	0	0	250	300	0	0	300	265	0	0	265	679	0	0	679	1,494
U. of Pittsburg	110	0	0	110	0	0	150	150	0	0	210	210	0	50	0	50	520
U. of Rochester	0	0	0	0	0	0	3,587	3,587	0	0	1,664	1,664	0	0	0	0	5,251
U.T. Arlington	50	82	0	132	0	0	474	474	0	0	230	230	0	0	0	0	836
S. Methodist	40	0	0	40	124	0	0	124	30	0	0	30	87	0	0	87	281
SUNY/Stony B.	27	0	0	27	0	0	1,045	1,045	0	0	1,037	1,037	0	0	426	426	2,535
Tufts University	50	0	0	50	20	0	0	20	20	0	0	20	0	0	0	0	90
U. Washington	0	0	0	0	0	0	240	240	0	0	318	318	0	0	1,377	1,377	1,935
U. of Wisconsin	230	0	0	230	429	0	0	429	665	0	0	665	1,014	0	0	1,014	2,338
Subtotal	3,009	7,038	0	10,047	4,580	4,263	11,342	20,185	3,809	7,771	7,218	18,798	3,920	9,123	10,590	22,625	71,704
Reserve	0	3	0	3	157	0	5,289	5,446	327	1,936	1,795	4,058	0	300	0	300	9,807
									0	2,602	2,928	5,530	0	0	0	0	0
Total	3,009	7,041	0	10,050	4,737	4,263	16,631	25,631	4,136	12,309	11,941	28,386	3,920	9,423	10,590	22,925	81,511